

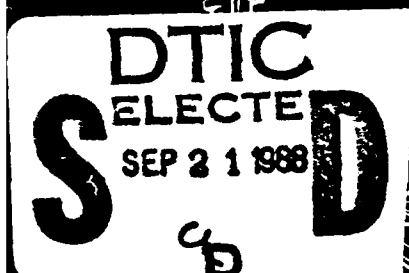
NAVTRASYSSEN TR88-010

**IMPROVING NAVY RECRUIT CONFIDENCE
EXPECTANCIES AND KNOWLEDGE IN A
SIMULATED CHEMICAL WARFARE ENVIRONMENT**

June 1988

Patrick J. Moskal*
Christopher P. Mulligan*
Rhonwyn Carson

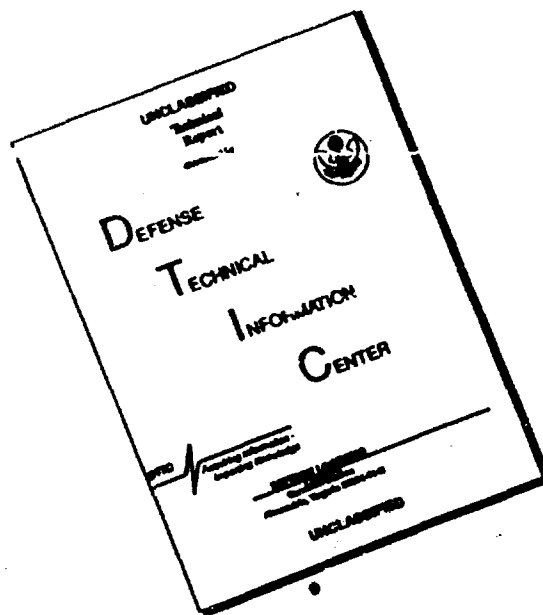
Naval Training Systems Center



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19 ABSTRACT (Continue on reverse if necessary and identify by block number) A behavioral modeling intervention was implemented in a U.S. Navy Chemical, Biological, and Radiological Defense (CBR-D) recruit training program. This training focused on the Navy Mark V protective mask donning and doffing procedures, and included performance in the gas chamber drill, a simulation of a chemically contaminated environment through which all recruits must pass. This drill is used to familiarize trainees with the dangerous CBR-D environment, and it is intended to instill confidence that they will be able to survive in a contaminated environment. High stress levels and low confidence expectancies have been shown to adversely affect performance, and previous research has shown that recruits who had completed this CBR-D training reported lower confidence expectancies than recruits who had not had this training. The present research was conducted in an effort to verify the previous findings and their attempt to improve confidence expectancies by employing a behavior modeling intervention.			
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Results indicated that behavior modeling and added rehearsal improved confidence expectancies and CBR-D knowledge scores compared to standard training procedures. However, the previous research was not supported; the present standard CBR-D training resulted in higher confidence expectancies than those reported in pretraining. However, the behavior modeling manipulation resulted in the highest scores. In addition, correlational analyses indicated that the confidence expectancy was related to better actual performance confidence and improved CBR-D content knowledge, a finding which supports previous research. Several recommendations stem from this research: (1) behavior modeling techniques should be incorporated into the recruit CBR-D training and into future training in which performance under stress is required, and (2) the recruit CBR-D training film should be changed from 8 mm presentation mode to videocassette format. In conclusion, this research has demonstrated that the behavior modeling approach to training provides beneficial results in the training for performance in stressful environments.



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EXECUTIVE SUMMARY

A behavioral modeling intervention was implemented in a U. S. Navy Chemical, Biological, and Radiological Defense (CBR-D) recruit training program, located at the Orlando Naval Training Station, Orlando, Florida. This training focused on donning and doffing procedures for the Navy Mark V protective mask, and included performance in the "gas chamber drill," a simulation of a chemically contaminated environment through which all recruits must pass. This drill is used to familiarize trainees with the dangerous CBR-D environment, and it is intended to instill confidence that they will be able to survive in a contaminated environment and successfully accomplish their mission.

CBR-D training, due to the nature of the material presented and the requirement of the gas chamber drill, is quite stress inducing. High levels of stress and low confidence expectancies have been shown to adversely affect performance (e.g., Kienan, 1986). Previous research has found that recruits who had completed this CBR-D training reported lower confidence expectancy levels than their counterparts who had yet to receive the training (Driskell, Carson, & Moskal, 1986). Confidence expectancy may be defined as one's confidence in his perceived ability to perform in a future task or situation. Therefore, the present research was conducted in an effort to verify the findings of Driskell et al. (1986), and to improve recruit confidence expectancy and basic CBR-D knowledge by the use of behavior modeling, a technique which has previously been shown to be very effective in improving performance in clinical and organizational settings. Whether it would be effective in training for performance in a stressful military environment was investigated here.

Different classes of Navy recruits undergoing basic CBR-D training received one of six different experimental manipulations. They consisted of four varied experimental modeling groups, one standard training group, and one no-film group. Initially, four pre-training groups were assessed in order to provide a baseline level of confidence expectancy and to determine if this measure was stable in the population. A pre-test/post-test experimental design measured subject responses on confidence expectancy. A post-test only design was employed to assess three other dependent measures: CBR-D content knowledge, actual gas chamber confidence, and the degree of mask seal that was obtained. Data was collected via questionnaires which assessed these dependent variables. The confidence expectancy questionnaire was administered to all groups, either before or

after the gas chamber exercise, depending upon the experimental manipulation (see Appendix B & C). The other three dependent variables were post-test measures, and therefore, they were assessed after the gas chamber drill.

The standard training procedure for all recruits consisted of the following sequence: a three hour lecture and film on general CBR-D information, viewing a second film (Number MN-8867) on donning, doffing, and care of the Mark V gas mask, and finally, performing the gas chamber exercise. The standard training group served as the control condition; here, no changes were made to the usual training procedure. The no-film group was included as an additional control in this research because, at the time of implementation, the CBR-D training program was being conducted without showing film MN-8867 because it had broken and no replacement was available. The pretraining groups received the confidence expectancy questionnaire before they received any CBR-D training, and provided a baseline measure of initial CBR-D confidence. The effectiveness of the experimental treatments was evaluated against this baseline measure.

The experimental treatments, which consisted of the modeling only (MO), modeling with repeated rehearsal (MRR), modeling with learning points (MLP), and modeling with learning points plus repeated rehearsal (MLPRR) groups, involved the manipulation of two independent variables: the form of the modeling film presented and the amount of rehearsal provided. Learning points, defined as the written description of the key behaviors to be learned (modeled), were incorporated into one version of the modeling film as superimposed captions. The other modeling film was identical except that the learning points were omitted. Of interest here was whether the addition of learning points made a significant difference on the dependent measures. The ST, MO, and MLP groups were instructed to rehearse the gas mask donning and doffing procedure once, which conforms to the standard training. The MRR and MLPRR groups, on the other hand, were instructed to rehearse the mask donning procedure three times. The repeated rehearsal was implemented to facilitate better task acquisition through overlearning, and enable the recruits to achieve a better mask seal. Three rehearsals were chosen because that was the maximum number that could be added to the classroom session without affecting the current classroom training schedule, although more rehearsals may have produced better results.

To ensure that the subject population was equal on preliminary CBR-D confidence, the four pre-training classes were given the confidence expectancy questionnaire prior to any CBR-D

training in an effort to: (1) establish a baseline level of pretraining confidence expectancy, (2) determine if the confidence variable was stable within the subject population, and (3) assess whether or not days of the week had a significant effect on confidence scores. (Confidence expectancy was found to be stable and days of the week did not affect the results.)

Importantly, the modeling with repeated rehearsal plus learning points (MLPRR) group resulted in higher confidence expectancy scores than the pretraining groups, thereby showing that the experimental manipulation was effective. Repeated rehearsal was also found to significantly increase scores on both gas chamber confidence and general CBR-D knowledge. In addition, the confidence expectancy variable was found to be significantly correlated with CBR-D general knowledge and gas chamber confidence, indicating the importance of attempting to increase recruit confidence in future training programs. However, the present state of training (the ST group) also obtained a substantially higher score than either the pretraining or no film conditions, although it was not as high as the MLPRR group.

Therefore, the conclusion reached is that the 1960 film (MN-8867), at least, should be shown to the recruits. However, because it is somewhat outdated in the material it presents, and this film is difficult to keep maintained and operating properly, it is recommended that new mask donning and doffing films should be developed for future recruit training, which incorporate behavior modeling techniques and repeated rehearsal. It is also recommended that the present film medium should be changed from 8 mm reel-to-reel to video cassette format. Video cassettes are preferable to reel-to-reel films in almost all respects (e.g., storage, handling, operation, duplication, & modification). For these reasons, and the present availability and low cost of video cassette recording equipment, video cassettes will be more cost effective in the long run.

In conclusion, this research has demonstrated that the modeling approach to training provides beneficial results with largely behavioral procedures, as it has done previously using more cognitively oriented tasks. This research has also shown that the behavioral modeling approach can be applied successfully in training situations involving stressful environments.

Given the preliminary nature of this project, the findings appear to provide valuable information for planning future training and experimentation in this area. This research has extended the information base that is available on the technique of behavior modeling, and of additional benefit is the fact that

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it has led to the specific recommendations for improving the Navy's recruit CBR-D training that are discussed above. More research is warranted in this area to clarify and refine the benefits, and the significant components of a behavior modeling approach to training for performance under stress, but the basic technique looks promising.

INTRODUCTION

The present research was conducted in an effort to assess and improve the performance confidence expectancies and general knowledge of Navy recruits in the area of basic Chemical, Biological, and Radiological Defense (CBR-D) skills. Previous research by Driskell, Carson, and Moskal (1986) found that Navy recruits who have undergone the standard CBR-D classroom instruction session, followed by the "gas chamber drill," were less confident than those recruits who had yet to undergo this training. In other words, confidence levels actually were lowered as a result of this training. Past research has shown that stress adversely affects task performance, which may lead to reduced confidence. When poor performance occurs in conjunction with a highly stressful situation, one's performance confidence, and hence actual performance, may be reduced in future situations in which the stressor is involved. Therefore, loss of performance confidence is a severe problem, especially in environments in which optimum performance is essential, such as military operations.

Stress causes a number of unwanted consequences including a high potential for producing errors in task performance. For example, dangerous or unproductive decisions are made, skilled performance deteriorates, and useful information and/or cues are ignored (e.g., Foushee, 1984). In stress inducing situations, such as military operations in which skilled performance is vital, personnel must be prepared to operate successfully. They must be trained not only in their tasks, but also how to successfully handle the stressor(s). Therefore, in order to effectively prepare personnel to perform in these environments, trainers must possess the knowledge necessary to design training to accomplish this goal.

According to researchers in World War II, the central stressor of combat is danger to life and limb (Williams, 1984). This type of stressor results in the most profound negative psychological consequences. Results from applied research have emphasized the importance of studying these psychological restrictions which are inherent in combat task performance. With the military environment becoming increasingly "high tech," the result is that tasks are now more complex and require a higher cognitive demand on the operators. Hence, the debilitating effects of stress on task performance will be even more profound.

In future training programs for highly stressful situations, it is important to: build the confidence of the trainee to

successfully perform in the threatening environment, build his confidence in his equipment, and build his confidence in his teammates. Once these goals have been achieved, the negative consequences of stress will be substantially reduced. However, at present there is no clear understanding of the factors causing stress, nor the consequences of stress in specific situations. Further research is necessary in order to provide empirical data needed to implement effective training programs for improving performance in stressful environments.

The present research attempts to improve Navy recruit confidence in a stressful situation, with the end result being improved performance, confidence, and basic skills in future encounters with the stressor. This research implements new strategies into the military training establishment, which have already been found to be quite successful in building confidence and reducing stress in the business, clinical, and academic environments.

Before commencing with the results of this research, a brief summary of the types of stressors found to affect performance is warranted. For example, crowding (Hayduk, 1983; Schmidt & Keating, 1979), noise (Broadbent, 1978; Poulton, 1978), performance pressure (Baumeister, 1984), and workload (Goldstein & Dorfman, 1978) are stressors concerning working conditions. More physically threatening stressors include the anticipatory threat of shock (Wachtel, 1968), dangerous conditions, such as parachuting (Hammerton & Tickner, 1969), bomb disposal (Rachman, 1982; Cox, Hallam, O'Connor, & Rachman, 1983), combat stress (Williams, 1984), and emergency situations, such as nuclear power plant accidents or flight emergencies (Foushee, 1984; Krahenbuhl, Marett, & Reid, 1978). In addition, research has examined diving emergencies (Radloff & Helmreich, 1972), flight emergency training (Dougherty, Houston, & Nicklas, 1957; Smode, Hall, & Meyer, 1966), performance decrements (Berkun, 1964; Kern, 1966), and combat stress (Kubala & Warnick, 1979). Recent research has been conducted in the area of stress effects on military task performance by both American and Soviet researchers (e.g., Burke, 1980; Hogan, Hogan, & Biggs, 1984; Driskell, Carson, & Moskal, 1986; Solov'yeva, 1981; Simonov & Frolov, 1977).

This research, as well as others, has shown that stressors elicit a number of adverse consequences. Physiological responses to stress include arousal, such as increased heartbeat, labored breathing, and trembling (Cuthbert, Kristeller, Simons, Hodes, & Lang, 1981), and lowered immunity to disease (Jemmott & Locke, 1984). Psychological effects of stress include motivational losses (Innes & Allnutt, 1967), redirection of attention and

increased errors (Baumeister & Steinhilber, 1984), increased self-monitoring (Carver, Blaney, & Scheier, 1979), cue restriction and narrowing of the perceptive field (Combs & Taylor, 1952; Easterbrook, 1959; Friedman, 1981; Groff, Baron, & Moore, 1983), decreased search behavior (Eysenck, 1976; Streufert & Streufert, 1981), longer reaction time to peripheral cues and decreased vigilance (Wachtel, 1968), performance rigidity (Staw, Sandelands, & Dutton, 1981), and effects on social behavior (Cohen, 1980). In addition, a recent evaluation of a CBR-D training exercise found that 20 percent of the participants manifested gross negative psychological reactions, and several reacted so severely that they could not continue with the exercise (Brooks, Ebner, Xenakis, & Balson, 1983). Carter and Cammermeyer (1985) also reported similar findings.

This brief review has been presented to point out that the negative effects of stress on performance are known to be extensive, and they can have profound consequences on performance, which could jeopardize mission accomplishment. However, because little is known concerning the development of training methodology to overcome stress related performance decrements, the present research was conducted in an effort to accomplish two goals: (1) to provide additional basic information in this area, and (2) to improve the training in an actual Navy training setting. Specifically, this research focused on improving Navy recruit confidence expectancies in the stressful environment of CBR-D.

Mitigating Stress Effects

Driskell (1984) has identified three ways in which to mitigate the effects of performance stress. First, an attempt may be made to select personnel most suited to operating in stressful environments. Hallam & Rachman (1980) found some moderate, but potentially significant, evidence to support the idea that there might be a small group of people who are particularly well-suited to carry out courageous action. However, in other situations, specific individuals cannot be selected in this manner because all personnel must be capable of performing in stressful environments. The military is a prime example.

Secondly, the environments themselves may be engineered to lessen the effects of stressful conditions. The human factors engineering of nuclear power plant control rooms is one example of an attempt to adapt the environment to the operator and to the operating conditions. However, certain situations involving emergency, wartime, or other unforeseen circumstances, preclude

the opportunity to effectively control the stressful environment itself.

Finally, the third area of intervention to lessen the effects of performance stress is training. According to Abraham (1982), one of the most effective preventative measures against psychological stress is arduous training. In this context, Labuc (1984) states that it is noteworthy that the U. S. Army's Special Forces select their men through training rather than selecting the men and then training them.

Approaches to Training in Stressful Environments

Several training methods have been devised to prepare personnel to operate successfully in stressful environments. One approach is overlearning, which put simply, is merely the rehearsal of a task beyond the point of mastery. Labuc (1984) states that:

"... it is evident from the literature on stress that well rehearsed tasks are least prone to psychological stress and secondly, highly drilled responses which are automatically activated at times of stress give the soldier something to do, and reduce his level of anxiety, so he will be less likely to panic." (p. 2)

Obviously, training that induces the correct responses to occur is crucial for performing in hazardous environments.

Now one may ask to what extent should the stressor be present during training? Several researchers have addressed the difficulties of training individuals for task performance under stress (e.g., Trumbull & Appley, 1967; Boyles, 1968). A central issue is that of stressor fidelity. Friedland and Keinan (1986) define the issue of stressor fidelity as:

" ... does the achievement of proficient task performance under stress require that stressors that are characteristic of the criterion situation be present with a high degree of fidelity in the course of training for the task?" (p. 71)

Arguments have been put forth supporting both high and low fidelity in training. Supporters of high-fidelity training hold that criterion-level stressors during task performance training will acquaint trainees with reactions to actual stress levels, thus replacing any exaggerated or mistaken conceptions of the

unknown stressor with experience and self-confidence. Additionally, trainees will be more likely to facilitate stimulus generalization and transfer of training under high-fidelity learning conditions (West, 1958; Willis, 1967; Coleman, 1976). Opponents of high-fidelity training suggest that the exposure to extreme stress during training might interfere with task acquisition, intensify fears, lower self-confidence, and result in the development of negative attitudes among the trainees (Kern, 1966; Janis, 1971; Meichenbaum, 1974).

So which viewpoint is correct? Certainly, task acquisition is the primary objective of any training program, and a high-fidelity stressor could indeed pose a distraction. On the other hand, the mastery of a task without the presence of relevant stressors could prove useless. Recent research has shown that there are some other factors to be considered when addressing the issue of stressor fidelity.

Keinan (1986) discovered that the "confidence expectancy" level of trainees, and their reported stress levels, are the most important variables when predicting task performance under stress. Confidence expectancy may be defined as an individual's perceived confidence in his ability to perform a specified future task. Keinan's research focused on three independent variables: trainee confidence expectancy, stressor fidelity, and performance feedback; and two dependent variables: task performance and perceived level of stress. Trainees with high confidence expectancies exhibited better task performance under high stressor fidelity training, and trainees with low confidence expectancies performed better under low stressor fidelity. Another finding of considerable significance was the fact that the trainees in the high fidelity/positive feedback condition experienced less stress than in any other condition. This last finding was recently supported by Driskell et al. (1986), who also found that confidence expectancy was directly related to the perceived level of stress.

Further research is necessary to fully understand this phenomenon, but this research demonstrates that the level of trainee confidence expectancy should be considered when determining the level of stressor fidelity in training. However, this information may be of no use in situations where trainees cannot be grouped by levels of confidence expectancy. One alternative to this dilemma is to raise the confidence expectancy levels of all trainees prior to exposure to the stressor (Friedland & Keinan, 1986). This "phased training" approach involves first training for the task, then exposing subjects to the stressor. Phased training has increased utility in

situations where mastery of the task is instrumental in attenuating the effects of the stressor. Thus, this approach may be very important for military tasks.

Experience with the stressor itself has the propensity to increase the confidence expectancy levels of the trainees. Trainee performance confidence levels have been shown to rise when the experience with the stressor has been positive (Caplan, 1964). Conversely, a negative exposure to a stressful event increases the likelihood that the trainee will experience negative effects during a subsequent encounter with the stressor (Goodhart, 1985).

To summarize thus far, a primary effort must be made to increase the confidence expectancies of the trainees. A viable attempt to achieve this goal among trainees can be made through phased training. Once the desired confidence expectancy level has been attained, trainees may then be exposed to criterion-level stressors. It is important that the exposure to these stressors result in a positive experience for the trainees. Admittedly, these are not the only methods by which to limit and/or prevent the negative effects of stressors; however, these techniques are seen as significant components of any training program that attempts to mitigate the debilitating effects of stressors on task performance.

The Behavior Modeling Approach

The behavior modeling approach to training (Goldstein & Sorcher, 1974) has drawn a good deal of attention recently because it incorporates the concepts of social-learning theory (Bandura, 1977), which includes modeling, role playing, social reinforcement, and transfer of training principles. It has been used as an effective training technique in a wide variety of settings. Numerous reports in the literature have shown that training groups given behavioral modeling have performed significantly better than training groups not given modeling. For example, modeling has been used effectively to produce lasting reduction of fear (Rachman, 1972), improve interpersonal skills (Latham & Saari, 1979), enhance assertiveness (Decker, 1980; Mann & Decker, 1984), and obtain greater organizational productivity and reduce grievances, absenteeism, and turnover rates through improved supervisory interpersonal skills (Porras & Anderson, 1981),

Since Goldstein and Sorcher's (1974) description of behavior modeling, a number of advances have been made to improve the effectiveness of the technique. Shortly after the modeling

approach was introduced, researchers were inquiring as to which component had the greatest impact on task acquisition. Latham and Saari (1979) included learning points in their modeling film in an attempt to improve the retentional processes associated with the behavior modeling procedure. Decker (1982) defines learning points as:

" ... the written description of the key behaviors seen performed by the model. Learning points can be used to (1) determine the model's key behaviors ... (2) help trainees attend to the key behaviors ... and/or (3) stimulate coding by the observer."
(p. 325)

Aside from including learning points in the modeling procedure, Latham and Saari (1979) included a control group that received only the learning points and not the full behavior modeling training, and a second control group that received neither the learning points nor the training. The results indicated that there were no significant differences between the two control groups, but the behavior modeling plus learning points training group was rated as being significantly better than both of the control groups. Naturally, the next question concerns the individual contribution of the learning points to the overall improvement of the training group's ratings. Latham and Saari's (1979) work cannot provide the answer, but they did introduce the use of learning points to the behavior modeling process.

Decker (1980) assessed the effects of verbal coding of the key behaviors, rehearsal of the task, source of the verbal codes, and the type of codes on the reproduction of modeled events. Here, "coding" refers to a specific strategy or set of instructions for memorizing information. The results indicated that significant main effects for both rehearsal and verbal coding occurred. Decker (1980) suggests the implementation of descriptive coding (descriptions of the key behaviors) and rehearsal when training inexperienced subjects. This situation would undoubtedly be found in the military.

The literature that has been mentioned thus far advocates the use of learning points and rehearsal in the formal behavior modeling procedure. Mann and Decker (1984) evaluated the effectiveness of learning points in facilitating skill acquisition. Their research utilized four conditions: learning points only, modeling only, combined (i.e., learning points and modeling), and interspersed (i.e., modeling with learning points interspersed throughout the modeling procedure). The conditions were designed to isolate the individual and combined effects of

learning points and modeling on the facilitation of recall and generalization of the selected skill material. An analysis of the results revealed that the learning points with modeling, either in the combined or interspersed condition, significantly facilitated generalization for some of the skills to be learned. Further examination of the results indicated that seeing the learning points alone or with a model significantly enhanced immediate recall of the skills. The recall measure showed that subjects who saw only learning points had recall scores equivalent to those seeing learning points and a form of the model. However, based on their generalization scores, learning-points-only subjects apparently were unable to transfer the verbal labels into the desired behaviors. These findings demonstrate, as did Latham and Saari's (1979) results, that giving subjects the learning points alone is insufficient to elicit the desired behavior. Mann & Decker (1984) presented the learning points, in the interspersed condition, on a modeling film as separate frames that preceded the key behaviors they were meant to emphasize. Their results did not completely bear out the hypothesis that the interspersed condition would have a greater positive effect on all of the skills than did the combined condition. They theorized that by interspersing the learning points as separate frames on the film, they may actually have caused interference, thus causing the subjects to have difficulty attending to the model. In order to circumvent this possibility, Mann and Decker (1984) suggest presenting the learning points as superimposed captions on the film during the modeling of the key behaviors.

Navy Recruit Chemical Defense Training

The present research focused on the Chemical, Biological, and Radiological Defense (CBR-D) training classes which are conducted at the Navy Recruit Training Command, Orlando, Florida. This training program attempts to ensure competent performance in a stressful environment. Of particular interest is the "gas chamber" exercise, a simulation of a chemically contaminated environment. It is used to familiarize trainees with the dangerous CBR-D environment, and it is intended to increase their confidence that they will survive in a contaminated environment and successfully perform their mission.

Attention to this particular program is warranted for several reasons. From a practical standpoint, research into this domain is important because: (1) between 60-160 recruits complete this training per day at the Orlando Recruit Training Command alone; (2) the training constitutes the first exposure to the chemical warfare environment for Navy recruits, and it is the

only formal training that all Navy personnel receive; (3) a similar training procedure is used across all four services; and (4) the information gathered by analyzing recruit chemical warfare training and simulation procedures will be directly applicable to the design of this type of training in all services, but in addition, it will apply to the design of training for other emergency or high stress environments.

In addition, there are theoretical reasons supporting this project. One fact that differentiates this research from previous behavior modeling programs is that it focuses on improving performance and confidence in a largely behavioral task, under stressful conditions. Typical modeling applications have concerned cognitive skills, such as managerial coaching, assertiveness, and helping behavior.

The current research examined three major theoretical questions directly. First, does the behavior modeling approach, when applied to a largely behavioral, highly stressful task, provide positive results similar to the benefits achieved when the procedure has been applied to cognitive, less stressful situations? Second, does the addition of captioned learning points to the behavior modeling process, initially proposed by Decker (1980, 1982) and Mann and Decker (1984), produce similar beneficial results in this stressful environment? Finally, is rehearsal as important to the modeling process using a stressful, behavioral situation as it has been found to be using cognitive tasks?

Naval recruit CBR-D training is conducted via a four-hour classroom and hands-on session. The training consists of two sequential parts: (A) classroom instruction in which the students receive subject matter information and indoctrination, stressing the importance of attention to training and preparation in the chemical defense area, and (B) a performance confidence exercise involving the gas chamber drill. In this exercise the trainees learn to don the standard Navy Mark V gas masks and enter a gas chamber that is contaminated with CS, a riot control gas. The procedure generally occurs as follows. Trainees enter the chamber thirty at a time in rows of five. They remain in the chamber for several minutes to get accustomed to the gas environment and to confirm that their masks are working properly. Next, they remove their masks one row at a time, state their full names and proceed out of the chamber. This procedure is meant to accomplish the following: (1) boost performance confidence by proving that the masks do work, (2) show that it is possible to survive in a chemical environment, (3) train the recruits to operate under stressful conditions, and (4) indoctrinate them to

the importance of the training.

Driskell et al. (1986) examined the effectiveness of the current chemical defense training simulation, and several significant results were obtained. First, the mean confidence expectancy level among the trainees was significantly lower after receiving the gas chamber simulation than it was prior to training. They believed that this drop in confidence was due to inadequate preparation for the gas chamber simulation, which resulted in a negative experience with the stressor. Second, those trainees who had high performance expectations experienced significantly less stress during the gas simulation exercise. Finally, those trainees who felt a greater sense of control over their situation also experienced significantly lower levels of stress. These results indicate that placing trainees in a chemical warfare defense training situation with little attempt to increase confidence and/or reduce the determinants of stress reactions may negatively affect their performance. Furthermore, this outcome may affect subsequent behavior in similar situations where performance is more crucial than in a training environment. As previously stated, a negative experience with a stressful event has been shown to increase the vulnerability to the adverse impact of a subsequent stressful experience (Goodhart, 1985). Therefore, a negative training experience may contribute to potentially adverse effects during later task performance. Rather than boost performance confidence, Driskell et al.'s (1986) research indicated that the present training procedures may reinforce the trainees' initial fears and consequently decrease confidence and performance.

Behavior Modeling applied to the Navy CBR-D Training Program

In an effort to improve the current CBR-D training program and recruit confidence expectancy levels, the present research examined the effect of a behavioral modeling intervention on the chemical warfare training program. The preceding review of the development of the behavior modeling approach delineated a few important additions to Goldstein and Sorcher's (1974) original guidelines: (1) rehearsal is a significant component of the modeling process and efforts should be made to encourage rehearsal, preferably after exposure to modeling stimuli; (2) learning points have been shown to enhance retentional processes that facilitate the generalization and recall of the desired behavioral skills; (3) the learning points should be shown contingent with the modeling film in order to achieve the best possible results; (4) Mann and Decker (1984) have obtained empirical evidence that strongly suggests that the best way to combine the learning points and the modeling film is by

superimposing the learning points as captions during the modeling of the key behaviors. The behavior modeling procedure that was implemented in the Navy CBR-D training program included all of these improvements to the modeling process in an effort to utilize the most effective behavior modeling intervention possible.

The behavior modeling intervention was used in an attempt to alleviate the previously observed negative effects of the gas chamber exercise (Driskell, et al., 1986), and consequently, to raise recruit confidence levels higher than they were prior to any CBR-D training. To accomplish this goal, a behavior modeling film was substituted for film, Number MN-8867, which is used to prepare personnel to don, doff, and care for the standard Navy (Mark V) gas mask. The behavior modeling film was shown in place of film MN-8867 in an effort to prepare the trainees for the gas chamber exercise more effectively.

In addition, the standard CBR-D training program allows the recruits to rehearse the gas mask donning procedure only once, immediately after viewing film No. MN-8867. A repeated rehearsal condition, in which the trainees rehearsed the gas mask donning procedure three times, was also implemented in order to assess the unique contributions of rehearsal to the modeling process.

METHOD

Subjects

This research was conducted with Navy recruits, all of whom receive their CBR-D training on day one, week six of their basic training program. Data was collected on 487 male recruits. The mean age of the sample was 19 years. Possible gender differences on the dependent measures were controlled for by selecting only male subjects for inclusion in the data analyses.

The Navy randomly assigns recruits to basic training companies when they enter the service. The CBR-D training is administered to a class of recruits every day, with each class consisting of one or two companies, depending on scheduling demands. A full strength company is composed of 80 members. Recruits are continuously evaluated throughout basic training, and consequently, some recruits are screened out. This results in company sizes of 60 to 70 recruits by the sixth week of training. Because of the variability in class size, an attempt was made to randomly select 50 male subjects from each CBR-D training class in order to obtain equal sample sizes across all groups. However, because several companies were smaller than fifty members, unequal sample sizes existed among some of the experimental groups.

A CBR-D training class was randomly assigned to each of the ten conditions employed. The ten conditions consisted of: four pre-training (PT) groups, one standard training (ST) group, one no-film (NF) group, and four experimental modeling groups: a modeling-only (MO) group, a modeling-with-repeated-rehearsal (MRR) group, a modeling-with-learning-points (MLP) group, and a modeling-with-learning-points-and-repeated-rehearsal (MLPRR) group. The four PT groups all had a sample size of 50, as did the MRR, MLP, MLPRR, and ST groups. The modeling only group had 38 subjects and the no film group had 49 subjects.

Apparatus

Behavior Modeling Film. The behavior modeling film was the major intervention that was implemented in this research. The new film was based on Navy film MN-8867, created in 1960, which provides instructions on the care and use of the Navy's Mark V gas mask. The new modeling film replaced the mask donning and doffing sequences of film MN-8867 with behavior modeling sequences depicting the donning and doffing procedures. Two versions of the new film, one with and one without learning

points, were developed. The learning points were superimposed on the film and did not require additional film length. The length of both new films was within eight seconds of the length of the original film they were substituting in order to control for any learning-time effects. The films were shown to the recruits via four 13-inch television monitors positioned around the classroom. (A better method of film presentation would have been preferred, such as larger screen size, but no other equipment was available.) Given the small screen size of the monitors, the learning points were also distributed to the subjects in printed form (Appendix A) to ensure that all subjects could read them.

Dependent Measures. A questionnaire was used to assess trainees' confidence expectancies concerning both their performance in a chemically contaminated environment and the safety of their CBR-D equipment. A pre-training questionnaire was comprised of twenty questions which focused on the confidence expectancy variable (Appendix B). A post-training questionnaire was comprised of those same twenty confidence expectancy questions, as well as a question assessing the quality of the subject's gas mask seal, a question concerning subject anxiety during the gas chamber exercise, and ten questions assessing CBR-D content knowledge (Appendix C).

Procedure

Independent Variables. The present research consisted of four experimental (MO, MRR, MLP, MLP RR) groups, one standard training (ST) group, one no-film (NF) group, and four pre-training (PT) groups. The standard training procedure for all recruits consists of the following sequence: a three hour lecture on general CBR-D information, viewing a film on the care and use of the Mark V gas mask, and performing the gas chamber exercise. Table 1 illustrates the experimental design and the manipulations that were utilized.

The standard training (ST) group served as the main control group; here, no changes were made to the usual training procedure. The no-film (NF) group was included as an additional control in this research because, at the time of implementation, the CBR-D training program was being conducted without showing film MN-8867 because it had broken and no replacement was yet available.

TABLE 1

Experimental design with group manipulations

GROUP	LECTURE	FILM	REHEARSAL	GAS CHAMBER
ST	YES	MN-8867	1	YES
MO	YES	Modeling	1	YES
MLP	YES	Modeling & Learning Pts.	1	YES
MRR	YES	Modeling	3	YES
MLPRR	YES	Modeling & Learning Pts.	3	YES
NF	YES	No	1	YES
PT	No	No	No	No

The NF group, therefore, served as a control condition for the actual state of the training program at the time this research was conducted. The pre-training (PT) groups received the confidence questionnaire before they received any training, and therefore provided a base-line measure of initial CBR-D confidence expectancy. The effectiveness of the experimental treatments was evaluated against this baseline measure. The experimental treatments, which consist of the modeling-only (MO), modeling-with-repeated-rehearsal (MRR), modeling-with-learning-points (MLP), and modeling-with-learning-points-and-repeated-rehearsal (MLPRR) groups, involved the manipulation of two independent variables: the form of the modeling film and the amount of rehearsal. The fact that a film was substituted for another film, without subject knowledge, was sufficient to discount any "Hawthorne" effects.

The ST, MO, and MLP groups were instructed to rehearse the gas mask donning and doffing procedure once, which conforms to the standard training procedure. The MRR and MLPRR groups were instructed to rehearse the mask donning procedure three times.

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The repeated rehearsal was implemented to facilitate better task acquisition through overlearning, and enable the recruits to achieve a better mask seal. Three rehearsals were chosen because that was the maximum number that could be added to the course without affecting the current training schedule, although more rehearsals may have produced better results.

The questionnaire measuring CBR-D confidence expectancies was administered to all groups, either before or after the gas chamber exercise, depending upon the experimental manipulation (see Appendix B and C). To ensure that the subject population was equal on preliminary CBR-D confidence, the four pre-training (PT) classes were given the confidence expectancy questionnaire prior to any CBR-D training in an effort to: (1) establish a base-line level of pre-training confidence expectancy, (2) determine if the confidence variable was stable within the subject population, and (3) assess whether or not days of the week had a significant effect on confidence scores.

RESULTS

This research examined a number of hypotheses. First, the CBR-D mean confidence expectancy and general knowledge dependent measures were predicted to be higher for the average of the modeling groups (MO, MLP, MRR, MLPRR) than for the standard training (ST) group, with the MLPRR group expected to possess the highest individual mean. The average of the modeling groups was used because all of the modeling groups were predicted to yield higher scores than that obtained by the standard training group, but whether the modeling groups, themselves, would significantly differ was unclear. Second, the mean confidence expectancy score was predicted to be higher for the modeling with learning points and repeated rehearsal (MLPRR) group than the mean of the pretraining (PT) baseline groups. As discussed previously, the Driskell et al. (1986) research found that the PT groups scored higher on confidence expectancy than the ST group. Thus, the comparison of mean MLPRR with mean PT was used to assess the effectiveness of the behavior modeling training. A related hypothesis was also based upon the findings of Driskell et al. (1986), in which the scores obtained were expected to be lower for the standard training (ST) group than the mean of the pretraining (PT) groups. Finally, an analysis was conducted to assess the individual and combined effects of the learning points and repeated rehearsal factors on the dependent measures.

The reliability of the confidence expectancy items contained on the questionnaire was assessed by calculating coefficient alpha (Nunnally, 1978). This measure was calculated for all four pretraining groups and for each individual experimental group. The reliabilities of the experimental groups' questionnaire scores were assessed individually, rather than as a total sample, because the experimental manipulations should have contributed to increased questionnaire score variances among the groups. Coefficient alpha was equal to .90 for the four pretraining groups and ranged from .83 to .91 for the six experimental groups. All of these values are well above .70, the generally accepted minimum useful value of reliability for a measurement instrument. The reliability of the knowledge items was not assessed as they measured objective CBR-D content knowledge. These content items were not used for predictive purposes but rather, as a discriminatory variable on which to compare CBR-D knowledge acquisition among the experimental groups. For a further discussion of reliability, consult Cohen and Cohen (1983).

Data Analyses on the Confidence Expectancy Data

These analyses investigated the hypotheses using the confidence expectancy dependent measure. All ten conditions were included because the confidence expectancy data was collected from all groups, including the pretraining conditions. The means were calculated for each group and they are displayed in Figure 1.

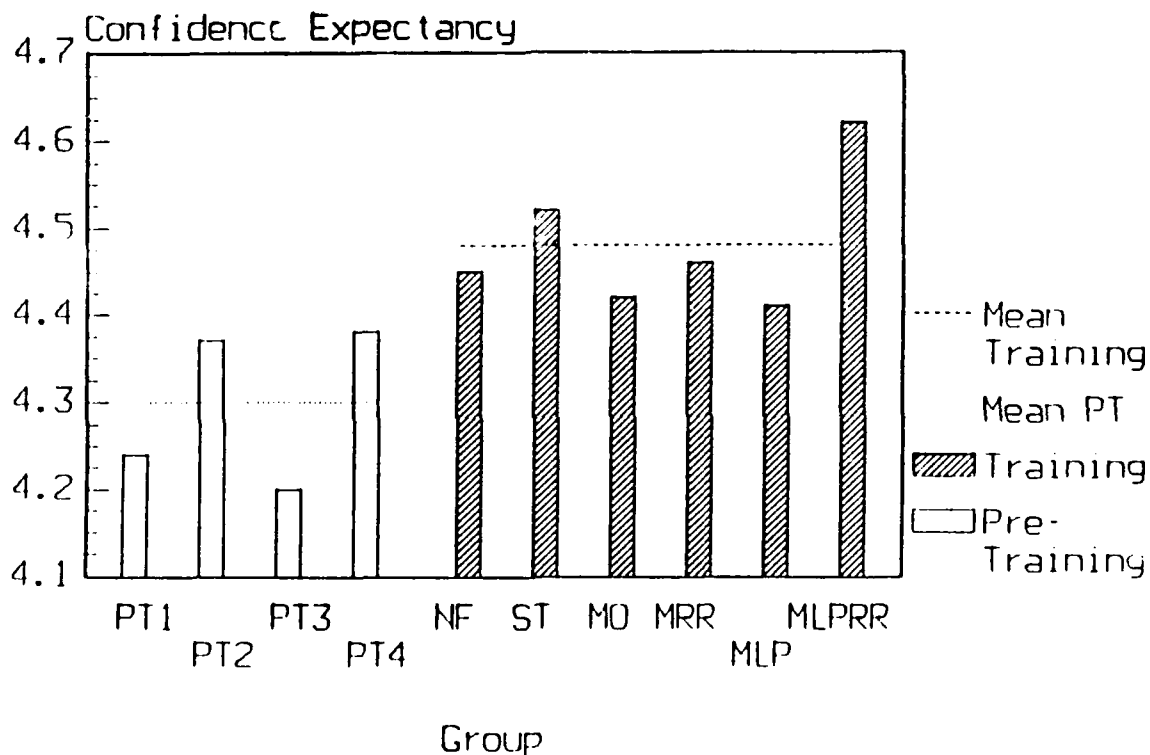


Figure 1. Mean confidence expectancy scores for all ten conditions.

First, an Analysis of Variance (ANOVA) was conducted on this data across the four pretraining (PT) groups. As anticipated, no significant differences were obtained between them ($F(3,196) = .84, p > .05$). This finding indicates that the confidence expectancy variable was indeed stable within the subject population, it established a baseline level of confidence against which the training effectiveness of the experimental manipulations was assessed, and it discounted any effects that days of the week may have contributed to the variances of the manipulations. Because each condition (classroom) had to be

examined on a different day, finding no differences due to days of the week was important.

The first hypothesis assessed whether or not significant differences existed between the average confidence expectancy level of the experimental modeling groups (MO, MRR, MLP, MLPRR) and the confidence expectancy level of the standard training (ST) group. To answer this question an ANOVA was conducted, which resulted in no significant differences among the confidence expectancy levels (see Figure 2 for the plotted means). Thus, no differences were found between the average confidence expectancy of the experimental modeling groups and the ST group. The MLPRR group did possess the highest overall mean confidence level, although this difference was not significant.

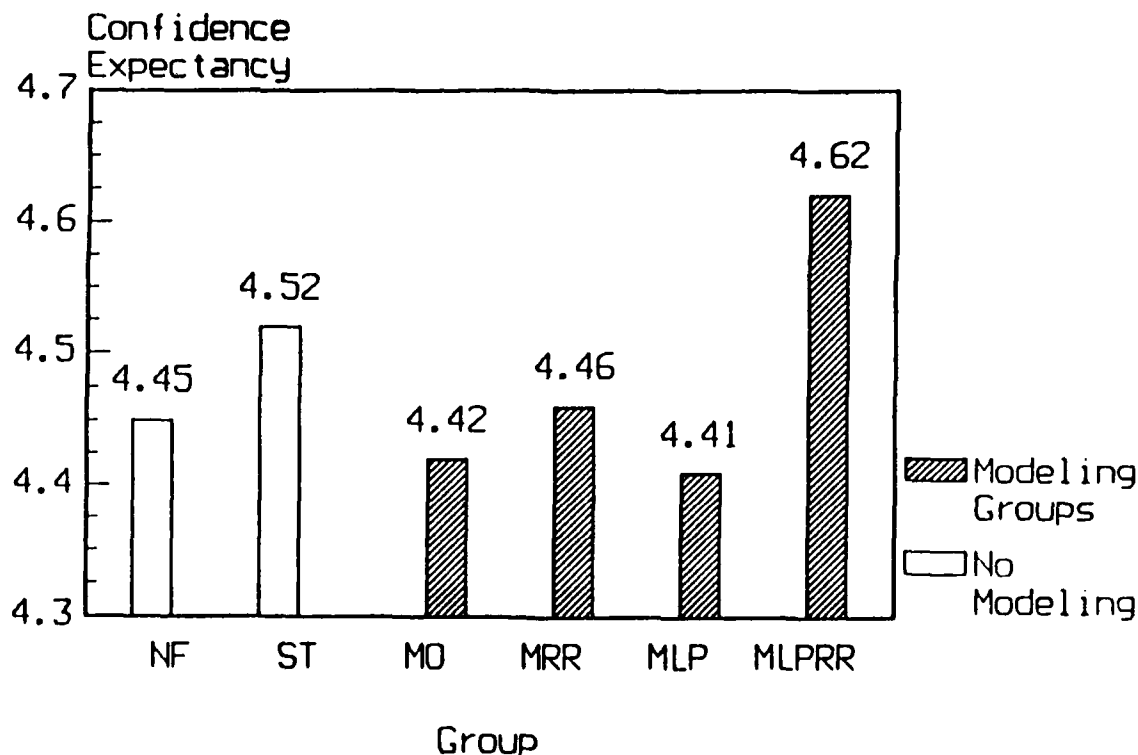


Figure 2. Mean confidence expectancy scores for the modeling groups compared to the mean of the standard training group.

As an additional analysis, the average of the modeling groups was contrasted with the mean of the no film (NF) group. The no film group was included here because it was often used as the standard training condition. This situation occurred because either the film (MN-8867) or the projection equipment was often broken, resulting in no film available for presentation. This ANOVA also

resulted in no significant differences between the groups ($F(1,477) = 0.09, p > .05$) (Figure 2).

The second analysis compared the confidence expectancies of the MLPRR group against the mean confidence level of the four PT groups. Figure 3 displays the plotted means. The results of this ANOVA indicated that the MLPRR group had a significantly higher mean confidence expectancy level than the average of the four PT groups ($F(1,477) = 9.54, p < .01$). No other significant differences were found among any of the ten groups.

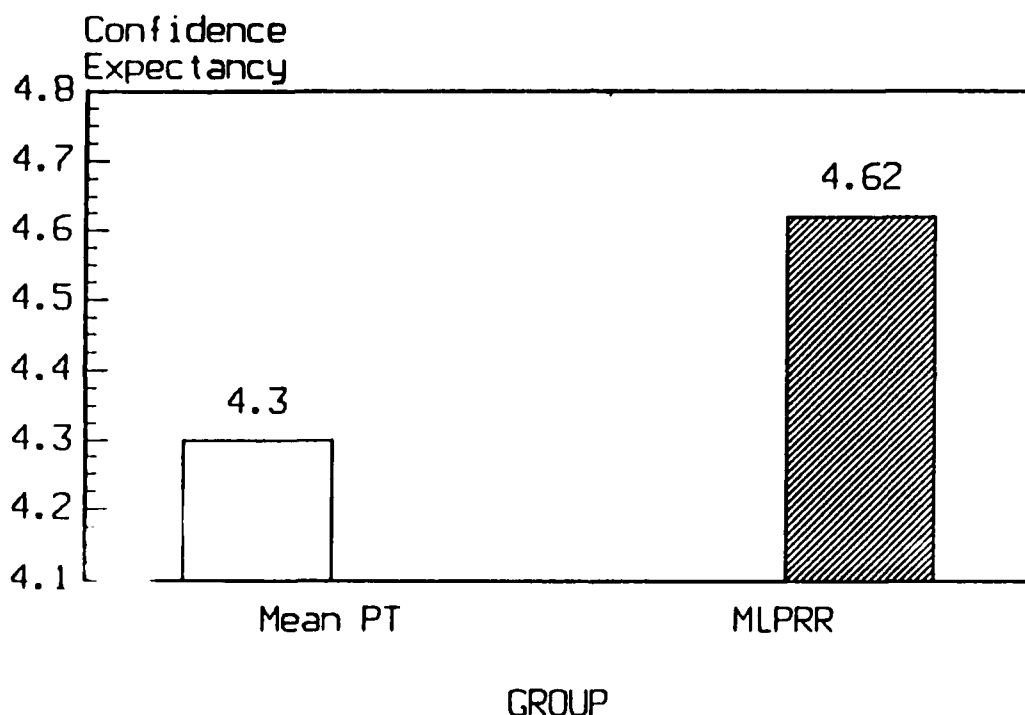


Figure 3. Mean confidence expectancy for the MLPRR group versus the average of the four pretraining (PT) groups.

Third, it was hypothesized that the confidence expectancy level of the ST group would be lower than the mean confidence expectancy level of the four PT groups. As mentioned, this prediction was based upon the earlier findings of Driskell et al. (1986). The mean for the ST group, however, was higher than the mean of the four PT groups, and therefore, this hypothesis was not confirmed (see Figure 1). Hence, no analysis was necessary to assess this hypothesis.

Finally, the effects of the repeated rehearsal and learning

points factors were assessed by conducting a 2 X 2 ANOVA. Surprisingly, no significant differences were found, which discounts the existence of any significant effects for the repeated rehearsal and learning points factors on the confidence expectancy measure.

Data Analyses on Degree of Mask Seal, Gas Chamber Confidence, and CBR-D Content Knowledge Variables

The next set of analyses assessed the same hypotheses described in the prior section, but here the dependent variables were the degree of mask seal reported in the gas chamber drill, gas chamber confidence (confidence concerning performance in the gas chamber itself), and CBR-D content knowledge scores. Only the six post-training groups (NF, ST, MO, MRR, MLP, & MLPRR) were included in these analyses because the post-training dependent measures could not be gathered from the four pretraining groups. The means for each of these dependent measures, for each group, are displayed in Figures 4-6.

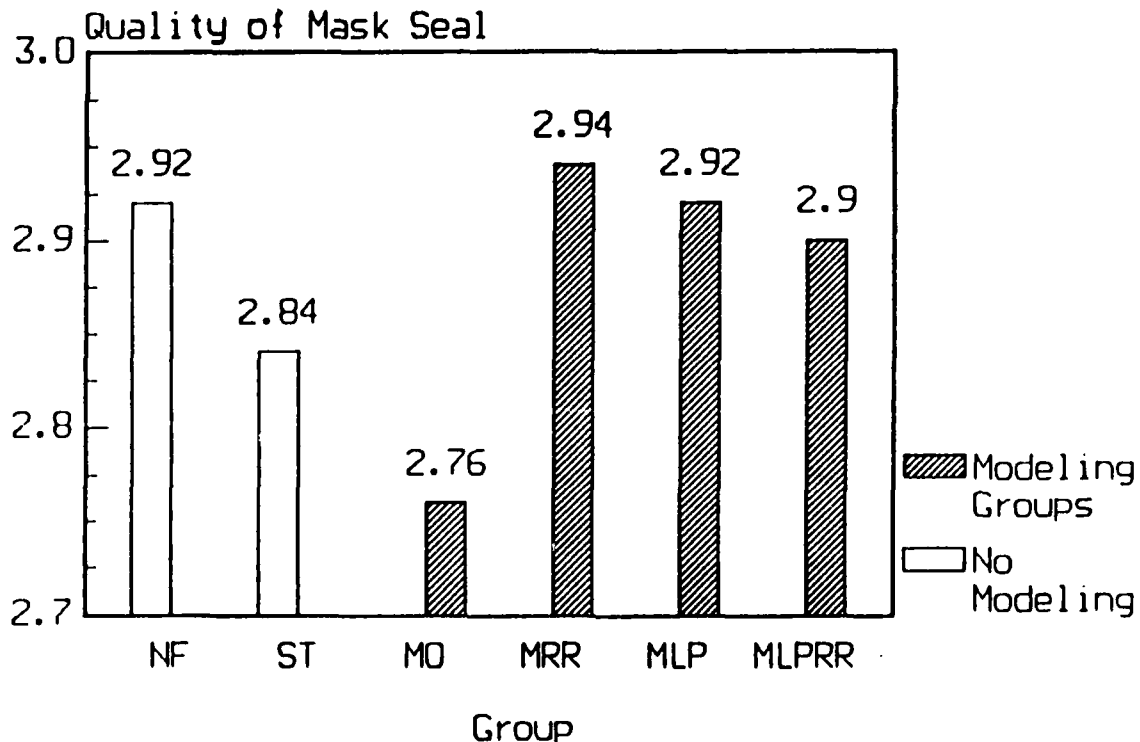


Figure 4. Mean score for each group on degree of mask seal.

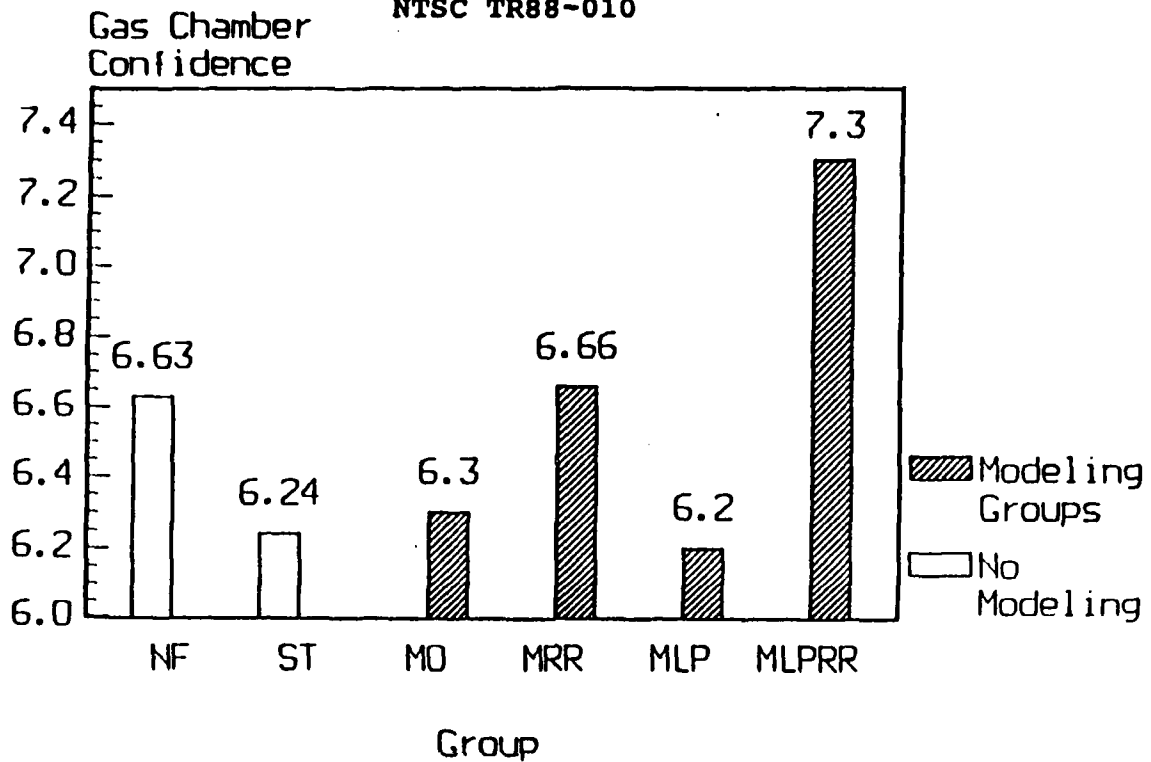


Figure 5. Mean gas chamber confidence score for each group.

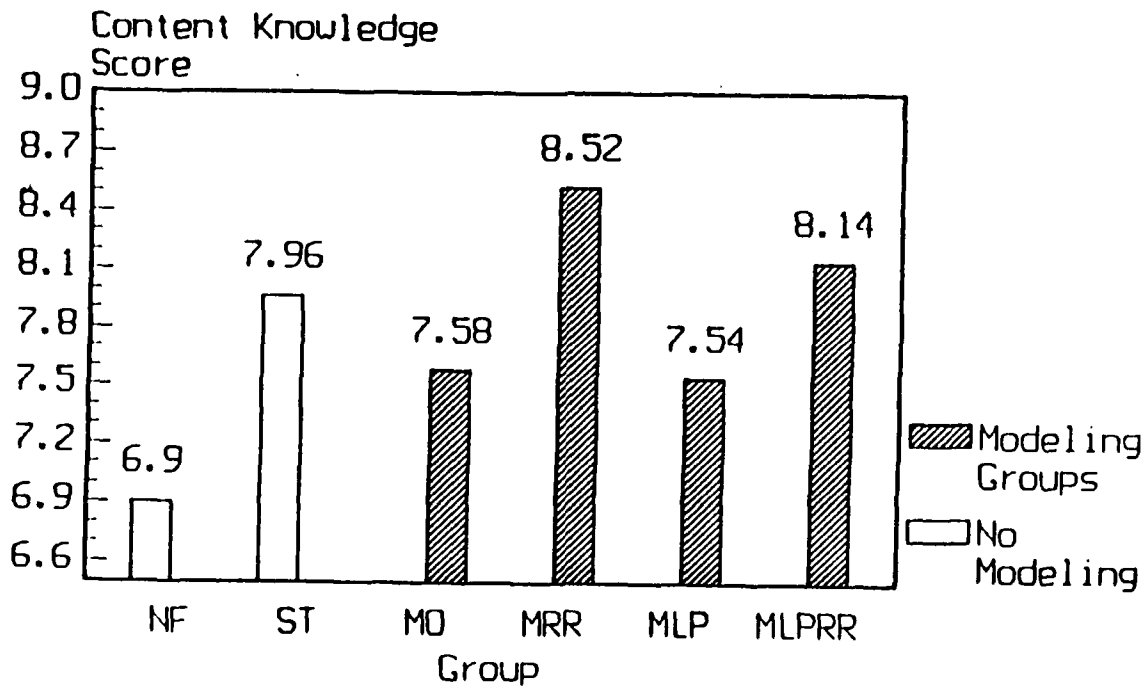


Figure 6. Mean CBR-D content knowledge score for each group.

First, a multivariate analysis of variance (MANOVA), using these three dependent variables, was conducted to contrast the post-test groups (NF, ST, MO, MRR, MLP, MLPRR). This analysis resulted in significant differences among the group means (Pillais Trace approximate $F(15,843) = 2.88$, $p < .001$). Next, post hoc analyses were conducted to determine the location of these significant differences. Using univariate ANOVAs, the CBR-D content knowledge dependent measure was found to be significantly different across the groups ($F(5,281) = 6.10$, $p < .001$) (see Figure 6). Further analyses were then conducted to determine the location of the significant differences among the six groups on this dependent variable. After reviewing the mean knowledge scores for the groups (Figure 6), analyses were conducted to determine if the ST group differed significantly from any of the experimental modeling groups. Because the mean CBR-D content knowledge score of the MRR and MLPRR groups was highest, it was compared with the knowledge score of the ST group. This analysis assessed the effects of modeling and repeated rehearsal against the standard training condition. No significant difference was found. The average knowledge score of the MO and MLP groups was then compared with the knowledge score of the ST group, and again no significant difference was found.

The first hypothesis was assessed by conducting a MANOVA, using the same three dependent measures as above, which contrasted the mean of the four experimental modeling groups (MO, MRR, MLP, MLPRR) with the mean of the standard training group (ST). The groups did not differ significantly on any of the three dependent measures (see Figures 4, 5, & 6). Next, a MANOVA was conducted which contrasted the mean of these four modeling groups with the mean of the no film (NF) group, and significant differences were obtained (Pillais Trace approximate $F(3,279) = 5.64$, $p < .01$). Univariate ANOVAs were conducted to locate the differences, and the results revealed that the mean score of the modeling groups was significantly higher than the mean of the NF group on the content knowledge dependent measure ($F(1,281) = 16.47$, $p < .001$) (Figure 6).

Next, the main effect of repeated rehearsal was assessed with ANOVAs, using each dependent measure separately, which contrasted the MRR and MLPRR groups with the MO and MLP groups. This analysis indicated that the repeated rehearsal groups (MRR, MLPRR) resulted in significantly higher gas chamber confidence and CBR-D content knowledge scores than the modeling groups without repeated rehearsal (MO, MLP) ($F(1,281) = 3.99$, $p < .05$; and $F(1,281) = 11.00$, $p < .01$, respectively). Figures 5 and 6 display the plotted means. Unexpectedly, a main effect of

repeated rehearsal was not found on the degree of mask seal dependent measure.

The main effect of learning points was investigated with an ANOVA which contrasted the learning points (MLP & MLPRR) with the no learning points (MO & MRR) groups. This analysis did not yield significant differences between the groups on any of the three dependent measures. Similarly, the interaction of repeated rehearsal and learning points was not significant on any of the three dependent measures (Figures 4, 5, & 6).

In an effort to provide a more accurate indication of the effectiveness of the experimental manipulations, and hence, to provide better discriminability between them, an additive combination score was computed for each subject by combining the scores obtained on each of the three dependent measures. The mean combination score was then determined for each group prior to conducting post hoc analyses. The additive scores were computed to illustrate the overall differences among the groups across the three dependent measures. Figure 7 displays the plotted combination scores.

An ANOVA was computed comparing the average combined score of the MRR and MLPRR groups with the average combined score of the remaining four groups. The MRR and MLPRR groups were used because they both included the modeling plus repeated rehearsal factors, and they were clearly the highest scoring manipulations. This analysis determined that the average combined score of the MRR and MLPRR groups was significantly better than the average combined score of the remaining four groups ($F(1,281) = 15.44$, $p < .001$).

Finally, a correlational analysis was conducted to examine if any relationships existed among the dependent measures, across all six of the post-test groups (NF, ST, MO, MLP, MRR, MLPRR). Interestingly, mean confidence expectancy was found to be directly related to both CBR-D content knowledge ($r=.14$, $p < .01$; $N=287$) and gas chamber confidence ($r=.37$, $p < .001$; $N=287$).

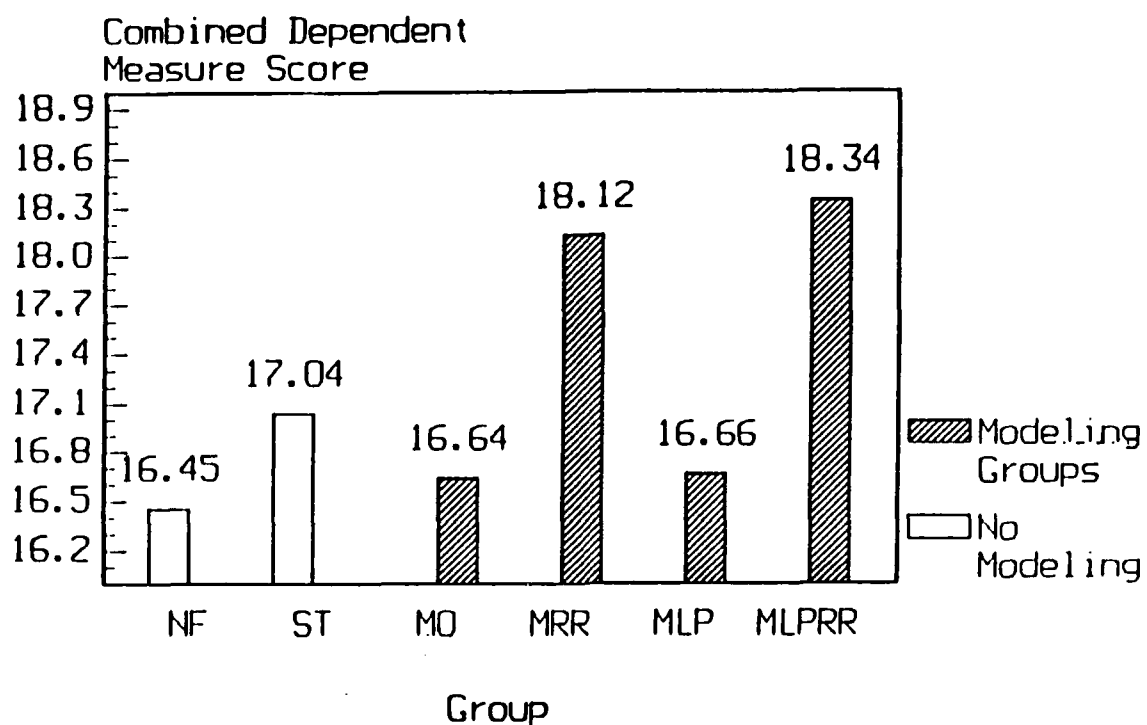


Figure 7. Combined dependent measure score for each post-test group. (The dependent measures used are the degree of mask seal, gas chamber confidence, and CBR-D content knowledge.)

DISCUSSION

The first hypothesis proposed that better confidence expectancies and CBR-D content knowledge would be obtained from the average of the modeling groups than from the standard training group. The average of the experimental modeling groups was used in this comparison because it was hypothesized that all four of the experimental groups would achieve greater performance levels than the standard training group. This hypothesis was not supported by the results (Figure 1). The relatively low performance of the modeling only (MO), modeling with repeated rehearsal (MRR), and modeling with learning points (MLP) groups resulted in no significant differences in performance levels between the standard training (ST) group and the modeling groups. However, better results were obtained by the modeling with learning points and repeated rehearsal (MLPRR) group, which was perceived to be the "ideal" condition as it benefited by being composed of all three experimental manipulations: modeling, repeated rehearsal, and learning points. When this group was compared to the ST group in post hoc analyses it resulted in a significantly higher score on the gas chamber confidence measure, and on the multivariate combination of the three dependent measures. Additionally, it is noteworthy that the MLPRR group achieved higher means than the ST group on the other three dependent measures, although these differences were not significant.

Hypothesis number two predicted that the confidence expectancy level of the modeling plus learning points and repeated rehearsal (MLPRR) group would be significantly higher than the average confidence level of the four pretraining groups. This hypothesis was supported, thereby confirming the training effectiveness of the experimental manipulations (Figure 3). This finding is in opposition to what Driskell et al. (1986) discovered regarding post-training confidence expectancy levels. All of the experimental groups in the present research attained confidence levels above that of the baseline level, although only the MLPRR group reached a significantly higher level of confidence expectancy. However, it is possible that the cause of this consistent post-training confidence increase may be due to factors other than the experimental manipulations. In the year and a half since the Driskell et al. (1986) experiment, a number of changes have occurred in the recruit CBR-D training. The CBR-D classroom session was revised with updated course materials as well as the implementation of active practice (rehearsal) into the instructional design. Currently, recruits must supply key words or phrases from the lesson into a workbook. They write

continuously throughout their three hour classroom session. This active practice forces the recruits to pay increased attention to the subject matter, and aids retention. This research documented an increased level of post-training confidence expectancy across all groups, which may well be attributable to those known changes in the training program. It is important to note, however, that the specific experimental manipulations that were implemented, especially the modeling with learning points and repeated rehearsal, did yield further increases in post-training confidence expectancy levels.

The third hypothesis proposed that the standard training group would exhibit lower confidence expectancy levels than the average of the pretraining groups. This hypothesis, intended to support the findings of Driskell et al. (1986), was rejected. The direction of the confidence expectancy levels between those groups was clearly in the opposite direction (Figure 1). This finding was most likely due to those factors outlined in the discussion of hypothesis number two, which is important because it demonstrates that the present recruit CBR-D training has improved substantially from the time of the Driskell et al. (1986) research. It appears that the added rehearsal (active practice writing in key words) that was recently incorporated into the CBR-D classroom training resulted in improved scores. However, the MLPRR manipulation did result in additional improvement.

Repeated rehearsal was found to significantly increase performance on two of the dependent measures on which it was assessed: gas chamber confidence and CBR-D content knowledge (Figures 5 and 6). The repeated rehearsal condition also resulted in higher means on the confidence expectancy and mask seal dependent measures, although these scores were not significant (Figures 2 & 4). The general implication is that repeated rehearsal resulted in improvement in knowledge and confidence to perform a task in a stressful environment. This finding is consistent with theoretical transfer of training principles. Training for a task is best accomplished by simulating the task in training. Consequently, a largely cognitive task would be optimally trained using cognitive cues, and training for a behavioral task would be accomplished best by implementing behavioral cues. The conclusion from this research is that the Navy recruit CBR-D training program would benefit by providing training materials incorporating behavioral modeling techniques. Especially important is the addition of more rehearsal time with the tasks.

Somewhat surprisingly, the learning points factor

resulted in no significant differences in any of the experimental manipulations. In the present training situation, the utility of including repeated rehearsal and learning points in the modeling process appears to be dependent upon the degree to which the task is cognitively or behaviorally oriented. Consequently, a largely cognitive task would be optimally trained with cognitive cues (modeling plus learning points), and training for a behavioral task would be optimally accomplished by implementing behavioral cues (modeling plus repeated rehearsal).

In an effort to further illustrate the performance of the groups across the three dependent measures of the questionnaire (degree of mask seal, gas chamber confidence, and CBR-D content knowledge), each subject's actual score on each dependent measure was added together and then transformed to a percentage of the total possible score. Those percentages were then averaged within each group in order to obtain a mean group performance percentage (See Figure 8 for the plotted means).

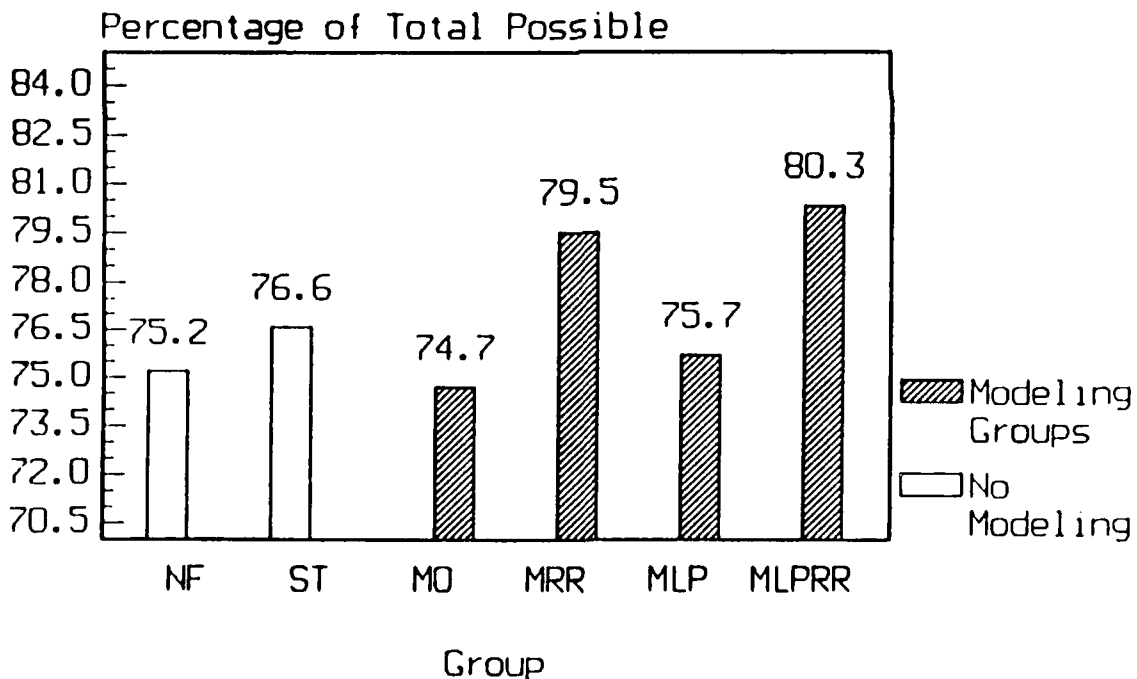


Figure 8. Mean group performance percentage across all post-test dependent variables.

The percentage performance means may be affected by large differences that occur among the groups on just one dependent

measure, which could result in one group possessing a higher performance percentage across all three dependent measures just because that group's score was greatly inflated on only one of the dependent measures. To control for this potential problem, the group mean ranks are also provided. Six points were awarded to the highest performing group on each dependent measure, and then the overall mean rank was computed. Figure 9 displays the plotted mean ranks. The similarities of Figures 8 and 9 demonstrate that the performance levels being depicted are indeed stable and not a function of large differences among the groups on just one dependent measure. Figures 8 and 9 also illustrate that the MRR and MLPRR groups show higher performance levels than the other four groups across the three dependent measures utilized by the questionnaire.

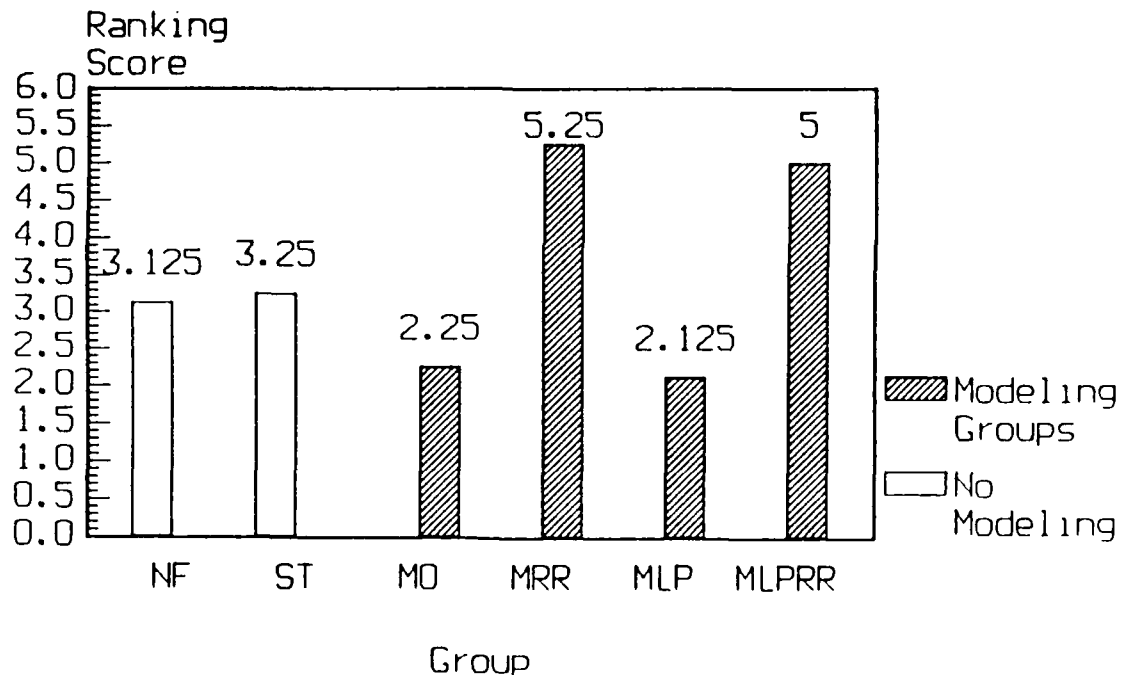


Figure 9. Mean Group rankings across all dependent variables (a high score signifies better performance).

Since no large differences exist between the performance levels of the MRR and MLPRR groups, it may not be necessary to incur the added costs of including learning points in the modeling film for this training application. This finding may be generalizable to other modeling applications involving training for a largely behavioral task.

Finally, the significant finding that the post-test mean confidence expectancy score was directly related to both the CBR-D knowledge score and gas chamber confidence is both interesting and important. Suggested here is that as confidence expectancy increases, then actual performance confidence increases, and similarly, general knowledge improves. Although causality cannot be determined using correlational results, these findings support the earlier work of Driskell et al. (1986) and Keinan (1986), regarding the importance of trainees possessing high confidence expectancy before actual performance on a task is required. Therefore, improving confidence expectancy, and confidence in general, should be an important factor in training for a stressful task.

In conclusion, this research has demonstrated that the modeling approach to training provides beneficial results with largely behavioral procedures, as it has previously using more cognitively oriented tasks. Certainly, this research has also shown that the behavioral modeling approach can be applied successfully in training situations involving stressful environments.

The present state of training (the ST group) did obtain substantially higher scores than in either the pretraining (PT) or no film (NF) conditions. Therefore, it is concluded that the 1960 film (MN-8867), at least, should be shown to the recruits. However, because it is somewhat outdated in the material it presents, and this film is difficult to keep maintained and operating properly, it is recommended that new mask donning and doffing films, which incorporate behavior modeling techniques and repeated rehearsal, be developed for future recruit training. Also highly recommended is changing the present film medium from 8 mm to video cassette. Video cassettes are better than films in almost all respects (e.g., storage, handling, operation, development, and modification). For these reasons, and the present availability and low cost of video cassette recording equipment, video cassettes will be cost effective in the long run.

Given the preliminary nature of this project, the findings appear to provide valuable information for planning future training and research. Several problems need to be resolved in order to refine this procedure in the future. For example, several classes were taught by different instructors, which poses the potential problem of introducing experimenter bias into the results. This situation could not be overcome due to scheduling constraints, but it should not be overlooked in future research

designs. A second problem is the likelihood that ceiling effects were introduced into the dependent measures because of the self-report method of data collection. Because recruits may have been unwilling to admit that they were not confident, for example, ceiling effects may have masked true differences in the experimental manipulations. A better method of determining recruit confidence expectancies should be devised for future investigations. Finally, it is desirable to have more control over the class scheduling and administration of the gas chamber drill. For example, depending upon the size of the class, different concentrations of the gas were used. This discrepancy could also have affected recruit responses. All of these factors need to be controlled more effectively in future research. However, even with these shortfalls, positive results were obtained in this preliminary investigation.

This research has extended the information base that is available on the technique of behavior modeling. Of additional benefit is the fact that this procedure has led to the specific recommendations for improving the Navy's recruit CBR-D training that are discussed above. More research is warranted in this area to clarify and refine the benefits, and the significant components of a behavior modeling approach to training for performance under stress, but the basic technique looks promising.

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APPENDIX A

MASK DONNING PROCEDURE

1. Extend the head harness straps completely.
2. Slide your thumbs inside the face piece under all the harness straps.
3. Grasp the top of the face piece.
Raise the mask to your chin.
Pull the harness up and over your head.
4. Adjust the top head strap to center the head pad at the back of head.
5. Adjust temple straps until the upper part of mask presses lightly against face.
6. Grasp the tab ends of the cheek straps.
Pull them straight back gently until mask is seated lightly against face.
7. To CLEAR toxic agents from inside the face piece:
Close the outlet cover port with the heel of your hand, and exhale forcibly.
8. To TEST if the mask is sealed:
Seal the canister ports with the palms of your hands.
Inhale normally until the mask collapses against your face.
Stop inhaling and hold your breath for 10 seconds.
(A properly fitted mask will stay collapsed for 10 seconds.)

MASK DOFFING PROCEDURE

1. Loosen cheek straps by placing index and middle fingernails under metal tongues of the strap buckles.
Pull straps straight out away from body.
2. Grasp both canisters and pull your mask down, out, and up over your head.

CBR-D QUESTIONNAIRE

The following questionnaire asks for your feelings and impressions about certain topics relating to chemical warfare defense. Research is being conducted to find out how recruits, like yourselves, feel about certain matters. We would like for you to assist in this chemical warfare research by completing this questionnaire. All of your answers will be kept strictly confidential, and nothing will go on your service record.

Length of time

you have been in the Navy_____ (# of weeks)

Your age_____

In which Navy service school are you enrolled?_____

Please circle the appropriate categories.

1. Your sex: Male Female

2. Do you wear eyeglasses? Yes No

Some of the following questions may seem hard to answer, because you have not had much experience in these areas. However, it is important for us to understand your feelings and impressions about the situations described by the questions. If your impressions are positive for some of the questions, we would like to know that; and if you have negative impressions, we would like to know that too. Remember all of your answers will be kept strictly confidential, so please answer each question honestly and accurately.

For each question, try to imagine your impressions of that situation-- what you imagine that situation would look like and how you would feel. Then think over the question, and circle the number of the answer that is closest to the way you feel. There are no right or wrong answers, we are only concerned with your feelings.

1. You are in charge of a team that is performing equipment maintenance topside when your ship comes under chemical attack by nerve gas. Your team is able to put on protective gear, but since your mission is crucial, you are forced to keep working in the presence of the chemical agents.

How well do you think you would be able to concentrate on your duties?

1 -----	2 -----	3 -----	4 -----	5 -----	6 -----
Full and complete concentra- tion on job (100%)	strong concentra- tion on job (80%)	moderate concentra- tion on job (60%)	slight concentra- tion on job (40%)	little concentra- tion on job (20%)	no concentra- tion on job (0%)

2. How interested would you be in entering a rating that would require a large amount of Chemical, Biological, and Radiological (CBR) duty in the event of a chemical attack?

1 -----	2 -----	3 -----	4 -----	5 -----	6 -----
Definitely against entering (0%)	Somewhat against entering (20%)	Slightly against entering (40%)	Slight interest in entering (60%)	Somewhat Interested in entering (80%)	Definitely Interested in entering (100%)

3. You are standing watch topside and your ship has come under full chemical attack. You are wearing protective clothing. How long do you think you could stand watch before you are replaced?

1-----2-----3-----4-----5-----6

0 minutes 15 minutes 30 minutes 1 hour 2 hours 3 hours or longer

4. Would you be eager for duty that may expose you to chemical weapons?

1-----2-----3-----4-----5-----6

I would be very eager (100%)	I would be eager (80%)	I would be somewhat eager (60%)	I would be somewhat reluctant (40%)	I would be reluctant (20%)	I would be very reluctant (0%)
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5. How at ease do you think you would feel while trying to perform your duties while under chemical attack?

1-----2-----3-----4-----5-----6

Extremely tense (0%)	Very tense (20%)	Somewhat tense (40%)	Slightly tense (60%)	at ease (80%)	very at ease (100%)
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6. You are a member of a team loading bombs on the flight deck of a carrier that is under chemical attack. How well do you think you would be able to perform your duty?

1-----2-----3-----4-----5-----6

With extreme difficulty (0%)	With much difficulty (20%)	With moderate difficulty (40%)	With some difficulty (60%)	With very little difficulty (80%)	As well as normal (100%)
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7. You are taking part in an amphibious landing. Your job is to conduct chemical decontamination procedures aboard a ship which has been contaminated with chemical agents. You will have to operate in a contaminated environment, identify, and attempt to neutralize the chemical agents. How confident are you that you could do the job?

1-----	2-----	3-----	4-----	5-----	6-----
Completely confident (100%)	Very confident (80%)	Somewhat confident (60%)	Somewhat unsure (40%)	Very unsure (20%)	No confidence (0%)

8. Your ship has been attacked with an unknown gas. You are performing duty topside. You hear the alarm and put on protective clothing. How much do you feel these conditions would affect your job performance?

1-----	2-----	3-----	4-----	5-----	6-----
Severe strain on performance (100%)	Moderate strain on performance (80%)	Some strain on performance (60%)	Slight strain on performance (40%)	Very little effect on performance (20%)	Would not bother performance (0%)

9. How sure are you that the chemical protective suit and mask will completely protect you against chemical agents?

1-----	2-----	3-----	4-----	5-----	6-----
Sure it will give protection (100%)	Very sure (80%)	Somewhat sure (60%)	Somewhat unsure (40%)	Very unsure (20%)	Sure it will not give protection (0%)

10. You are aboard ship in port and the naval station has been attacked with unknown chemical agents. A superior orders you to go out in protective clothing and keep track of the readings on topside chemical agent detection equipment. How safe would you feel in your protective gear?

1-----2-----3-----4-----5-----6

Absolutely would not feel safe (0%)	Probably would not feel safe (20%)	Would feel somewhat unsafe (40%)	Would feel somewhat safe (60%)	Would probably feel safe (80%)	Would feel completely safe (100%)
--	---	---	---	---	--

11. How willing would you be to accept topside duty during a chemical attack?

1-----2-----3-----4-----5-----6

Very willing to accept (100%)	Somewhat willing to accept (80%)	Less willing to accept (60%)	Would accept with some reservations (40%)	Would accept only in extreme circumstances (20%)	Would not be willing under any circumstances (0%)
--	---	---------------------------------------	--	--	---

12. How much confidence would you have if you were to enter a sealed room filled with a vomiting gas while wearing the protective suit and mask?

1-----2-----3-----4-----5-----6

No confidence (0%)	Very little confidence (20%)	Slight confidence (40%)	Much confidence (60%)	Very strong confidence (80%)	Would enter with complete confidence (100%)
--------------------------	------------------------------------	-------------------------------	-----------------------------	------------------------------------	--

13 Imagine what it would be like if you came under attack by chemical weapons. Use the pairs of words listed below to describe your feelings of having to perform your mission during chemical combat conditions.

Circle the number on each line that shows how you think you would feel. For example, if you think you would feel very calm, you would circle the number 6 for line A; or if you think you would feel somewhat excited, you would circle the number 2. Then you should do the same thing for the remaining lines.

	Very	Somewhat	A little	A little	Somewhat	Very						
A. excited	1	-----	2	-----	3	-----	4	-----	5	-----	6	calm
B. capable	1	-----	2	-----	3	-----	4	-----	5	-----	6	helpless
C. panicky	1	-----	2	-----	3	-----	4	-----	5	-----	6	under control
D. confident	1	-----	2	-----	3	-----	4	-----	5	-----	6	doubtful
E. doomed	1	-----	2	-----	3	-----	4	-----	5	-----	6	safe
F. success	1	-----	2	-----	3	-----	4	-----	5	-----	6	failure
G. hopeless	1	-----	2	-----	3	-----	4	-----	5	-----	6	hopeful
H. clear- thinking	1	-----	2	-----	3	-----	4	-----	5	-----	6	confused

CBR-D QUESTIONNAIRE

The following questionnaire asks for your feelings and impressions about certain topics relating to chemical warfare defense. Research is being conducted to find out how recruits, like yourselves, feel about certain matters. We would like for you to assist in this chemical warfare research by completing this questionnaire. All of your answers will be kept strictly confidential, and nothing will go on your service record.

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How well do you think you would be able to concentrate on your duties?

1 -----	2 -----	3 -----	4 -----	5 -----	6 -----
Full and complete concentra- tion on job (100%)	strong concentra- tion on job (80%)	moderate concentra- tion on job (60%)	slight concentra- tion on job (40%)	little concentra- tion on job (20%)	no concentra- tion on job (0%)

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1 -----	2 -----	3 -----	4 -----	5 -----	6 -----
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1-----2-----3-----4-----5-----6

0 minutes	15 minutes	30 minutes	1 hour	2 hours	3 hours or longer
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4. Would you be eager for duty that may expose you to chemical weapons?

1-----2-----3-----4-----5-----6

I would be very eager (100%)	I would be eager (80%)	I would be somewhat eager (60%)	I would be somewhat reluctant (40%)	I would be reluctant (20%)	I would be very reluctant (0%)
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5. How at ease do you think you would feel while trying to perform your duties while under chemical attack?

1-----2-----3-----4-----5-----6

Extremely tense (0%)	Very tense (20%)	Somewhat tense (40%)	Slightly tense (60%)	at ease (80%)	very at ease (100%)
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6. You are a member of a team loading bombs on the flight deck of a carrier that is under chemical attack. How well do you think you would be able to perform your duty?

1-----2-----3-----4-----5-----6

With extreme difficulty (0%)	With much difficulty (20%)	With moderate difficulty (40%)	With some difficulty (60%)	With very little difficulty (80%)	As well as normal (100%)
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7. You are taking part in an amphibious landing. Your job is to conduct chemical decontamination procedures aboard a ship which has been contaminated with chemical agents. You will have to operate in a contaminated environment, identify, and attempt to neutralize the chemical agents. How confident are you that you could do the job?

1-----2-----3-----4-----5-----6

Completely confident (100%)	Very confident (80%)	Somewhat confident (60%)	Somewhat unsure (40%)	Very unsure (20%)	No confidence (0%)
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8. Your ship has been attacked with an unknown gas. You are performing duty topside. You hear the alarm and put on protective clothing. How much do you feel these conditions would affect your job performance?

1-----2-----3-----4-----5-----6

Severe strain on performance (100%)	Moderate strain on performance (80%)	Some strain on performance (60%)	Slight strain on performance (40%)	Very little effect on performance (20%)	Would not bother performance (0%)
--	---	---	---	--	--

9. How sure are you that the chemical protective suit and mask will completely protect you against chemical agents?

1-----2-----3-----4-----5-----6

Sure It will give protection (100%)	Very sure (80%)	Somewhat sure (60%)	Somewhat unsure (40%)	Very unsure (20%)	Sure it will not give protection (0%)
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--	---	---	---	---	--

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1-----2-----3-----4-----5-----6

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--	---	---------------------------------------	--	--	---

12. How much confidence would you have if you were to enter a sealed room filled with a vomiting gas while wearing the protective suit and mask?

1-----2-----3-----4-----5-----6

No confidence (0%)	Very little confidence (20%)	Slight confidence (40%)	Much confidence (60%)	Very strong confidence (80%)	Would enter with complete confidence (100%)
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13 Imagine what it would be like if you came under attack by chemical weapons. Use the pairs of words listed below to describe your feelings of having to perform your mission during chemical combat conditions.

Circle the number on each line that shows how you think you would feel. For example, if you think you would feel very calm, you would circle the number 6 for line A; or if you think you would feel somewhat excited, you would circle the number 2. Then you should do the same thing for the remaining lines.

	Very	Somewhat	A little	A little	Somewhat	Very	
A. excited	1-----	2-----	3-----	4-----	5-----	6-----	calm
B. capable	1-----	2-----	3-----	4-----	5-----	6-----	helpless
C. panicky	1-----	2-----	3-----	4-----	5-----	6-----	under control
D. confident	1-----	2-----	3-----	4-----	5-----	6-----	doubtful
E. doomed	1-----	2-----	3-----	4-----	5-----	6-----	safe
F. success	1-----	2-----	3-----	4-----	5-----	6-----	failure
G. hopeless	1-----	2-----	3-----	4-----	5-----	6-----	hopeful
H. clear- thinking	1-----	2-----	3-----	4-----	5-----	6-----	confused

14. During the gas chamber exercise, how good a seal did you get with the protective mask?

1-----2-----3

Excellent	Some	Poor
seal	trouble	seal
(no leaks)	with seal	(felt leak)

15. Please circle the number on the scale that best reflects how you felt during the gas chamber exercise.

0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10

very	com-	relaxed	steady	not	Indiff-	hesi-	uncom-	nerv-	fright-	panic
calm	fortable			bothered	erent	tant	fortable	ous	ened	stricken

The following questions ask you for information about chemical weapons. Please circle the letter of the correct answer.

1. Which of the following is not a type of chemical agent?
 - A. Blister agent
 - B. Blood agent
 - C. Radiation agent
 - D. Nerve agent

2. Which of the following is the correct method for putting on the protective mask?
 - A. Chin first
 - B. Head first
 - C. Pull over the head and down with both hands
 - D. Put straps on back of head first

3. Which of the following chemical agents can cause severe skin burns?
 - A. Radiological agents
 - B. Blood agents
 - C. Blister agents
 - D. Riot control agents

4. What is the first action you should take when you hear a "GAS" alarm?
 - A. Take cover
 - B. Put on the protective mask
 - C. Continue your mission until directed by superiors
 - D. Administer antidote

5. When you place your hands over the canister inlets of your mask and breathe in, a properly sealed mask should:
 - A. Collapse against your face
 - B. Keep its normal shape
 - C. Allow a small amount of air to enter
 - D. Defog the lens

6. After you have initially fitted your mask, what is the only adjustment you should have to make when you put on the mask at a later time?

- A. Adjust the center head pad only
- B. Adjust the cheek straps only
- C. Adjust center head pad and cheek straps
- D. Adjust canister inlet

7. The protective mask will provide protection against all of the following, except:

- A. Nerve agents
- B. Blood agents
- C. Smoke from fires
- D. Biological contamination

8. How long are the mask filters effective in a contaminated environment?

- A. 1 hour
- B. 3 hours
- C. 6 hours
- D. Indefinitely

9. How long should it take you to put on and clear the protective mask?

- A. 3 seconds
- B. 9 seconds
- C. 20 seconds
- D. 1 minute

10. Which of the following is not a symptom caused by nerve agents?

- A. Skin burns
- B. Nausea
- C. Headache
- D. Mental Impairment

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